UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,109	03/12/2004	Christina Woody Mercier	112056-0427	8926

24267 7590 08/28/2008

CESARI AND MCKENNA, LLP
88 BLACK FALCON AVENUE
BOSTON, MA 02210

EXAMINER	
WASSUM, LUKE S	

ART UNIT	PAPER NUMBER
2167	

MAIL DATE	DELIVERY MODE
08/28/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/800,109	MERCIER ET AL.	
	Examiner	Art Unit	
	Luke S. Wassum	2167	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 June 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *23-49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *23-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 13 June 2008 has been entered.

Response to Amendment

2. The Applicants' amendment, filed 13 June 2008, has been received, entered into the record, and considered.

3. As a result of the amendment, claims 23-46 have been amended, and new claims 47-49 have been added. Claims 1-22 have been previously canceled. Claims 23-49 are now pending.

4. The examiner acknowledges the Applicants' request for interview, presented on page 12 of the Applicants' remarks.

The examiner attempted to contact the attorney of record to schedule the requested interview. A message was left on 11 August 2008, but while receipt of the message was acknowledged, the examiner was not subsequently contacted to schedule an interview.

Priority

5. The examiner acknowledges the Applicants' claim to domestic priority under 35 U.S.C. § 120, as a continuation of application 09/375,819, filed 16 August 1999.

Claim Objections

6. Claims 47 and 48 are objected to because of the following informalities:

Both claim 47 and 48 are written as 'system' claims, but claim 23, parent of claim 47 is drawn to a 'storage system', and claim 31, parent of claim 48, is drawn to a 'method'.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 49 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Claim 49 recites the limitations "the source", "the write request", "the destination", "the snapshot" and "the snapshot map". There is insufficient antecedent basis for these limitations in the claim.

Claim Rejections - 35 USC § 101

10. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

11. Claim 49 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

12. Regarding claim 49, this claim cites a computer-readable media.

The Applicants' specification fails to give a specific definition to the term "computer-readable media".

Any claim whose limitations are either explicitly claimed as being implemented in software, or could be reasonably interpreted as being implemented in software, must be claimed in combination with an appropriate medium to establish a statutory category of invention and enable any functionality to be realized in order for the claimed subject matter to be statutory under the provisions of 35 U.S.C. § 101.

The Applicants' above-cited lack of a definite disclosure regarding the nature of the claimed computer-readable media renders the claims non-statutory, since it leaves open the possibility that the Applicants intend the term "computer-readable media" to be interpreted as including printed paper, transmission media, signals, or other forms of energy. Such an interpretation would render the claims non-statutory under the provisions of 35 U.S.C. § 101. "A transitory, propagating signal…is not a "process, machine, manufacture, or composition of matter."…thus such a signal cannot be patentable subject matter." *In re Nuijten*, 500 F3d 1346, 84 USPQ2d 1495 (CAFC), 20 September 2007.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claims 23, 26, 28, 29, 31, 34, 36, 37, 39-41, 45 and 46 are rejected under 35 U.S.C. 102(b) as being anticipated by **Ohran et al.** (U.S. Patent 5,649,152).

15. Regarding claim 23, **Ohran et al.** teaches a storage system as claimed, comprising:

a) a destination to store a snapshot from a source (see disclosure of the creation of a static image of data stored on a mass storage system as it existed at a particular point in time by creating a virtual device containing the static image, col. 2, lines 49-53; see also disclosure of the use of preservation memory 106, col. 2, lines 55-58; see also disclosure of the creation of the virtual device in step 204, drawing Figure 2 and col. 4, lines 25-30);

b) a process to initiate a snapshot operation of the source, the snapshot having a snapshot range of data bytes of the source (see process illustrated in drawing Figure 2; see also disclosure of the initiation of the snapshot creation process, col. 4, lines 14-19 et seq., the claimed 'range' being defined by the extent of disclosed mass storage system 104, which in one embodiment is a partition of a disk, col. 3, lines 50-52 et seq.);

c) a write request to modify a range of data bytes of the source (see disclosure of write operations, col. 4, lines 29-41 et seq.);

d) the storage system to determine if the range of data bytes are within the snapshot range (see disclosure that write operations directed to mass storage system 104 are intercepted, meaning that a decision as to whether to intercept any given write operation, based upon whether the write operation is directed to the disk partition making up mass storage system 104 or to other disk partitions is inherently made, col. 4, lines 29-41 et seq.);

e) in response to determining that the range of data bytes are in the snapshot range, the storage system to determine if the range of data bytes have been written to the snapshot (see disclosure that step 210 determines if there is a block of data associated with the mass storage address specified in the

write operation in preservation memory, drawing Figure 2 and col. 4, lines 42-46);

f) in response to determining that the range of data bytes have been written to the snapshot, the write request to be written to the source (see disclosure that if there is a block of data associated with the write address in preservation memory, step 212 is skipped and step 214 is executed, col. 4, lines 42-48; see also disclosure that in step 214 the data to be written by the mass storage write operation is written to the location on mass storage system 104 specified by the mass storage write address, col. 5, lines 61-63); and

g) in response to determining that the range of data bytes have not been written to the snapshot, the process first to copy the range of data bytes of the source to the snapshot, and then the process to write the write request to the source (see disclosure that if there is not a block of data associated with the write address in preservation memory, step 212 is executed prior to the execution of step 214, col. 4, lines 42-48; see also disclosure that in step 212, a copy of the block of data currently located at the mass storage write address is placed in preservation memory; see also disclosure that in step 214 the data to be written by the mass storage write operation is written to

the location on mass storage system 104 specified by the mass storage write address, col. 5, lines 61-63).

16. Regarding claim 31, **Ohran et al.** teaches a method as claimed, comprising:

a) starting a snapshot command from a source to a destination, the snapshot command specifying a snapshot range of data bytes of the source (see disclosure of the initiation of the snapshot creation process, col. 4, lines 1419 et seq., the claimed 'range' being defined by the extent of disclosed mass storage system 104, which in one embodiment is a partition of a disk, col. 3, lines 50-52 et seq.);

b) in response to receiving the snapshot command, taking a snapshot of the snapshot range using a command to control one or more devices on which the source is stored, the snapshot including a snapshot map and snapshot data (see disclosure of the mass storage system 104 [the claimed source], the creation of the virtual device and preservation memory 106 [the claimed snapshot], and block association memory 108 [the claimed snapshot map], col. 4, lines 14-62 et seq.);

c) receiving a write request to modify a range of data bytes of the source (see disclosure of write operations, col. 4, lines 29-41 et seq.);

d) determining if the range of data bytes are within the snapshot range (see disclosure that write operations directed to mass storage system 104 are intercepted, meaning that a decision as to whether any given write operation is directed to the disk partition making up mass storage system 104 or to other disk partitions is inherently made, col. 4, lines 29-41 et seq.);

e) determining, in response to the range of data bytes being in the snapshot range, if the range of data bytes has been written to the snapshot (see disclosure that step 210 determines if there is a block of data associated with the mass storage address specified in the write operation in preservation memory, drawing Figure 2 and col. 4, lines 42-46);

f) writing, in response to the range of data bytes having been written to the snapshot, the write request to the source (see disclosure that if there is a block of data associated with the write address in preservation memory, step 212 is skipped and step 214 is executed, col. 4, lines 42-48; see also disclosure that in step 214 the data to be written by the mass storage write operation is written to the location on mass storage system 104 specified by the mass storage write address, col. 5, lines 61-63); and

g) copying, in response to the range of data bytes having not been written to the snapshot, the range of data bytes to the snapshot, and then writing the write request to the source (see disclosure that if there is not a block of data associated with the write address in preservation memory, step 212 is executed prior to the execution of step 214, col. 4, lines 42-48; see also disclosure that in step 212, a copy of the block of data currently located at the mass storage write address is placed in preservation memory; see also disclosure that in step 214 the data to be written by the mass storage write operation is written to the location on mass storage system 104 specified by the mass storage write address, col. 5, lines 61-63).

17. Regarding claim 39, **Ohran et al.** teaches a computer-implemented method as claimed, comprising:

a) starting a snapshot from a source to a destination, the snapshot having a snapshot range of data bytes of the source (see disclosure of the initiation of the snapshot creation process, col. 4, lines 1419 et seq., the claimed 'range' being defined by the extent of disclosed mass storage system 104, which in one embodiment is a partition of a disk, col. 3, lines 50-52 et seq.);

b) receiving a write request to modify a range of data bytes of the source (see disclosure of write operations, col. 4, lines 29-41 et seq.);

c) determining if the range of data bytes are within the snapshot range (see disclosure that write operations directed to mass storage system 104 are intercepted, meaning that a decision as to whether any given write operation is directed to the disk partition making up mass storage system 104 or to other disk partitions is inherently made, col. 4, lines 29-41 et seq.);

d) determining, in response to the range of data bytes being in the snapshot range, if the range of data bytes has been written to the snapshot (see disclosure that step 210 determines if there is a block of data associated with the mass storage address specified in the write operation in preservation memory, drawing Figure 2 and col. 4, lines 42-46);

e) writing, in response to the range of data bytes having been written to the snapshot, the write request to the source (see disclosure that if there is a block of data associated with the write address in preservation memory, step 212 is skipped and step 214 is executed, col. 4, lines 42-48; see also disclosure that in step 214 the data to be written by the mass storage write operation is written to the location on mass storage system 104 specified by the mass storage write address, col. 5, lines 61-63); and

f) copying, in response to the range of data bytes having not been written to the snapshot, the range of data bytes to the snapshot, and then writing the write request to the source (see disclosure that if there is not a block of data associated with the write address in preservation memory, step 212 is executed prior to the execution of step 214, col. 4, lines 42-48; see also disclosure that in step 212, a copy of the block of data currently located at the mass storage write address is placed in preservation memory; see also disclosure that in step 214 the data to be written by the mass storage write operation is written to the location on mass storage system 104 specified by the mass storage write address, col. 5, lines 61-63).

18. Regarding claim 40, **Ohran et al.** teaches a system as claimed, comprising:

a) a destination to store a snapshot from a source (see disclosure of the creation of a static image of data stored on a mass storage system as it existed at a particular point in time by creating a virtual device containing the static image, col. 2, lines 49-53; see also disclosure of the use of preservation memory 106, col. 2, lines 55-58; see also disclosure of the creation of the virtual device in step 204, drawing Figure 2 and col. 4, lines 25-30);

b) a process to initiate a snapshot operation of the source, the snapshot having a snapshot range (see process illustrated in drawing Figure 2; see also disclosure of the initiation of the snapshot creation process, col. 4, lines 14-19 et seq., the claimed 'range' being defined by the extent of disclosed mass storage system 104, which in one embodiment is a partition of a disk, col. 3, lines 50-52 et seq.);

c) a write request to modify a range of data bytes of the source (see disclosure of write operations, col. 4, lines 29-41 et seq.);

d) the system to determine if the range of data bytes are within the snapshot range (see disclosure that write operations directed to mass storage system 104 are intercepted, meaning that a decision as to whether to intercept any given write operation, based upon whether the write operation is directed to the disk partition making up mass storage system 104 or to other disk partitions is inherently made, col. 4, lines 29-41 et seq.);

e) in response to determining that the range of data bytes are in the snapshot range, the system to determine if the range of data bytes have been written to the snapshot (see disclosure that step 210 determines if there is a block of data associated with the mass storage address specified in the write

operation in preservation memory, drawing Figure 2 and col. 4, lines 42-46);

f) in response to determining that the range of data bytes have been written to the snapshot, the write request to be written to the source (see disclosure that if there is a block of data associated with the write address in preservation memory, step 212 is skipped and step 214 is executed, col. 4, lines 42-48; see also disclosure that in step 214 the data to be written by the mass storage write operation is written to the location on mass storage system 104 specified by the mass storage write address, col. 5, lines 61-63); and

g) in response to determining that the range of data bytes have not been written to the snapshot, a process first to copy the range of data bytes of the source to the snapshot, and then the process to write the write request to the source (see disclosure that if there is not a block of data associated with the write address in preservation memory, step 212 is executed prior to the execution of step 214, col. 4, lines 42-48; see also disclosure that in step 212, a copy of the block of data currently located at the mass storage write address is placed in preservation memory; see also disclosure that in step 214 the data to be written by the mass storage write operation is written to

the location on mass storage system 104 specified by the mass storage write address, col. 5, lines 61-63).

19. Regarding claim 46, **Ohran et al.** teaches a method as claimed, comprising:

a) receiving a write request, the write request to modify a range of data bytes in a source (see disclosure of write operations, col. 4, lines 29-41 et seq.);

b) determining if the range of bytes is within a snapshot range (see disclosure that write operations directed to mass storage system 104 are intercepted, meaning that a decision as to whether any given write operation is directed to the disk partition making up mass storage system 104 or to other disk partitions is inherently made, col. 4, lines 29-41 et seq.);

c) determining that the range of data bytes has not been written to the snapshot (see disclosure that step 210 determines if there is a block of data associated with the mass storage address specified in the write operation in preservation memory, drawing Figure 2 and col. 4, lines 42-46);

d) in response to determining that the range of bytes has not been written to a snapshot, copying the range of bytes from the source to the snapshot, and then writing the write request to the source (see disclosure that if there is

not a block of data associated with the write address in preservation memory, step 212 is executed prior to the execution of step 214, col. 4, lines 42-48; see also disclosure that in step 212, a copy of the block of data currently located at the mass storage write address is placed in preservation memory, col. 5, lines 48-53);

e) updating a snapshot map, wherein the snapshot map indicates which blocks are located in the snapshot (see disclosure of the use of block association memory to contain entries to associate blocks stored in preservation memory 106 with the unique addressed of blocks on mass storage system 104, col. 4, lines 56-62; see also disclosure that block association memory is updated as part of the copying of data from the mass storage system 104 to preservation memory 106, col. 5, lines 48-53); and

f) modifying the range of bytes of data in the source from the write request (see disclosure that in step 214 the data to be written by the mass storage write operation is written to the location on mass storage system 104 specified by the mass storage write address, col. 5, lines 61-63).

20. Regarding claim 26, **Ohran et al.** additionally teaches a storage system further comprising the process is executed on a file server (see disclosure that the computer system running the method of the disclosed invention can be used as a file server, col. 6, lines 50-55 et seq.).

21. Regarding claim 28, **Ohran et al.** additionally teaches a storage system further comprising the process is operable to control multiple storage systems (see disclosure that mass storage system 104 can be any writable block-addressable storage system, such as one or more disks, col. 3, lines 50-51 et seq.).

22. Regarding claim 29, **Ohran et al.** additionally teaches a storage system further comprising the write request includes SCSI commands (see disclosure that the mass storage system 104 is a SCSI or IDE magnetic disk connected to a digital computer 102 through an appropriate controller, col. 3, lines 60-65).

23. Regarding claim 34, **Ohran et al.** additionally teaches a method further comprising executing the snapshot command by a replication manager (see disclosure of a user indicating that a static image of the mass storage system is desired and accomplished through the running of a special program, an operating system call or an

operator command as appropriate, col. 4, lines 14-24, the fact that the snapshot is carried out by a 'replication manager' being inherent since the creation of a snapshot entails the creation of a replica of the specified snapshot data; any process which manages the creation of a replica can be inherently classified as a 'replication manager').

24. Regarding claim 36, **Ohran et al.** additionally teaches a method further comprising controlling multiple storage systems by a replication manager (see disclosure that mass storage system 104 can be any writable block-addressable storage system, such as one or more disks, col. 3, lines 50-51 et seq., the fact that the snapshot is carried out by a 'replication manager' being inherent since the creation of a snapshot entails the creation of a replica of the specified snapshot data; any process which manages the creation of a replica can be inherently classified as a 'replication manager').

25. Regarding claim 37, **Ohran et al.** additionally teaches a method further comprising including a SCSI command in the write request (see disclosure that the mass storage system 104 is a SCSI or IDE magnetic disk connected to a digital computer 102 through an appropriate controller, col. 3, lines 60-65).

26. Regarding claim 41, **Ohran et al.** additionally teaches a system further comprisingthe process is executed on a file server (see disclosure that the computer system running the method of the disclosed invention can be used as a file server, col. 6, lines 50-55 et seq.) and is operable to control the source and one or more other storage devices (see disclosure that mass storage system 104 can be any writable block-addressable storage system, such as one or more disks, or a partition of a disk, col. 3, lines 50-51 et seq.).

27. Regarding claim 45, **Ohran et al.** additionally teaches a system further comprising the process is operable to specify a block size so that the storage system writes fixed size blocks (see disclosure of the use of fixed-size blocks, col. 5, lines 23-41).

Claim Rejections - 35 USC § 103

28. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

29. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

30. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

31. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Ohran et al.** (U.S. Patent 5,649,152) in view of **Smith et al.** (U.S. Patent 5,241,631).

32. Regarding claim 49, **Ohran et al.** teaches a computer-readable media comprising instructions for execution in a processor for the practice of a method of operating a server comprising:

a) receiving at the source the write request issued from a file system, the write request specifying a first range of data bytes of the source, the write request being received while the source is being copied to the destination (see disclosure of write operations, col. 4, lines 29-41 et seq.); and

b) in response to receiving the write request, checking if the first range overlaps with the range specified by the snapshot and, if so, copying the first range from the source to the snapshot, updating the snapshot map, and then allowing the write request to write to the source (see disclosure that write operations directed to mass storage system 104 are intercepted, meaning that a decision as to whether any given write operation is directed to the disk partition making up mass storage system 104 or to other disk partitions is inherently made, col. 4, lines 29-41 et seq.; see also disclosure that step 210 determines if there is a block of data associated with the mass storage address specified in the write operation in preservation memory,

drawing Figure 2 and col. 4, lines 42-46; see also disclosure that if there is not a block of data associated with the write address in preservation memory, step 212 is executed prior to the execution of step 214, col. 4, lines 42-48; see also disclosure that in step 212, a copy of the block of data currently located at the mass storage write address is placed in preservation memory, col. 5, lines 48-53; see also disclosure of the use of block association memory to contain entries to associate blocks stored in preservation memory 106 with the unique addressed of blocks on mass storage system 104, col. 4, lines 56-62; see also disclosure that block association memory is updated as part of the copying of data from the mass storage system 104 to preservation memory 106, col. 5, lines 48-53; see also disclosure that in step 214 the data to be written by the mass storage write operation is written to the location on mass storage system 104 specified by the mass storage write address, col. 5, lines 61-63).

Ohran et al. does not explicitly teach a computer-readable media wherein the write request command is held in a cache while steps are taken to ensure consistency of the snapshot.

Smith et al., however, teaches the use of a write buffer cache architecture, which allows write requests to be held in a FIFO buffer cache while awaiting execution (see col. 17, lines 11-26 et seq.).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a FIFO buffer cache to hold write request commands until they could be executed, since this allows the microprocessor to continue other operations without the need to wait until the write commands have all been executed (see col. 17, lines 11-26).

33. Claims 24, 27, 32 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ohran et al.** (U.S. Patent 5,649,152) as applied to claims 23, 26, 28, 29, 31, 34, 36, 37, 39-41, 45 and 46 above, and further in view of **Tawil** (U.S. Patent 6,421,723).

34. Regarding claims 24 and 32, **Ohran et al.** teaches a storage system and method substantially as claimed.

Ohran et al. does not explicitly teach a storage system and method wherein the storage device is a RAID controller.

Tawil, however, teaches the use of a conventional RAID controller (see col. 3, lines 63-67; see also col. 4, lines 1-11).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate a RAID array to the system of **Ohran et al.**, since it is well known in the art that the use of RAID arrays provides redundancy which prevents data loss in the event of a data storage device failure.

35. Regarding claims 27 and 35, **Ohran et al.** teaches a storage system and method substantially as claimed.

Ohran et al. does not explicitly teach a storage system and method wherein the file server is connected to a storage area network switch and the file server communicates with the storage device controller through the storage area network switch.

Tawil, however, teaches the use of a storage area network (see col. 1, lines 30-42).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate a storage area network, since they offer centralized storage of data for increased efficiency and data handling, and provide data access reliability and availability, unobtrusive capacity expansion, improved data backup and recovery, and performance that is competitive with local data storage (see col. 1, lines 30-36).

36. Claims 25, 33, 47 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ohran et al.** (U.S. Patent 5,649,152) as applied to claims 23, 26, 28, 29, 31, 34, 36, 37, 39-41, 45 and 46 above, and further in view of **Smith et al.** (U.S. Patent 5,241,631).

37. Regarding claim 25, **Ohran et al.** teaches a storage system substantially as claimed, further comprising:

a) the range of the source specified by the snapshot is a first range, and the write request specifies a second range of data bytes of the source (see disclosure of a user indicating that a static image of the mass storage system is

desired, said indication being analogous to the claimed snapshot command, col. 4, lines 14-24; note also the disclosure that mass storage system 104 can be any writable block-addressable storage system, such as one or more disks or a partition of a disk, a partition being a fixed portion of a disk, col. 3, lines 50-56; see also col. 5, lines 23-41; see also disclosure of the intercepting of write commands to the source volume, col. 4, lines 35-41 et seq.); and

b) the storage system is operable, in response to receiving the write request while the source is being copied to the destination, to check if the first range overlaps with the second range and, if so, copy the second range from the source to the snapshot, update a snapshot map, and then allow the write request to write to the source (see disclosure in the Abstract; see detailed disclosure of this process at col. 5, line 48 through col. 6, line 40; see also flowchart illustrated in Figure 2).

Ohran et al. does not explicitly teach a storage system wherein the write request command is held in a cache while steps are taken to ensure consistency of the snapshot.

Smith et al., however, teaches the use of a write buffer cache architecture, which allows write requests to be held in a FIFO buffer cache while awaiting execution (see col. 17, lines 11-26 et seq.).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a FIFO buffer cache to hold write request commands until they could be executed, since this allows the microprocessor to continue other operations without the need to wait until the write commands have all been executed (see col. 17, lines 11-26).

38. Regarding claim 33, **Ohran et al.** teaches a method substantially as claimed, further comprising:

a) receiving at the source the write request issued from a file system, the write request specifying a first range of data bytes of the source, the write request being received while the source is being copied to the destination (see disclosure of a user indicating that a static image of the mass storage system is desired, said indication being analogous to the claimed snapshot command, col. 4, lines 14-24; note also the disclosure that mass storage system 104 can be any writable block-addressable storage system, such as

one or more disks or a partition of a disk, a partition being a fixed portion of a disk, col. 3, lines 50-56; see also col. 5, lines 23-41; see also disclosure of the intercepting of write commands to the source volume, col. 4, lines 35-41 et seq.); and

b) in response to receiving the write request, checking if the first range overlaps with the range specified by the snapshot and, if so, copy the first range from the source to the snapshot, update the snapshot map, and then allowing the write request to write to the source (see disclosure in the Abstract; see detailed disclosure of this process at col. 5, line 48 through col. 6, line 40; see also flowchart illustrated in Figure 2).

Ohran et al. does not explicitly teach a method wherein the write request command is held in a cache while steps are taken to ensure consistency of the snapshot.

Smith et al., however, teaches the use of a write buffer cache architecture, which allows write requests to be held in a FIFO buffer cache while awaiting execution (see col. 17, lines 11-26 et seq.).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a FIFO buffer cache to hold write request commands until they could be executed, since this allows the microprocessor to continue other operations without the need to wait until the write commands have all been executed (see col. 17, lines 11-26).

39. Regarding claims 47 and 48, **Ohran et al.** teaches a system substantially as claimed.

Ohran et al. does not explicitly teach a system wherein the write request is places in a first in first out queue in response to determining that the range of data bytes have not been written to the snapshot.

Smith et al., however, teaches the use of a write buffer cache architecture, which allows write requests to be held in a FIFO buffer cache while awaiting execution (see col. 17, lines 11-26 et seq.).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a FIFO buffer cache to hold write request commands until they could

be executed, since this allows the microprocessor to continue other operations without the need to wait until the write commands have all been executed (see col. 17, lines 11-26).

40. Claims 30 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ohran et al.** (U.S. Patent 5,649,152) as applied to claims 23, 26, 28, 29, 31, 34, 36, 37, 39-41, 45 and 46 above, and further in view of **Dulai et al.** (U.S. Patent 6,205,479).

41. Regarding claims 30 and 38, **Ohran et al.** teaches a storage system and method substantially as claimed.

Ohran et al. does not explicitly teach a storage system and method wherein the controller is operable to send the one or more storage device commands by using one of an in-band protocol or an out-of-band protocol.

Dulai et al., however, teaches a storage system and method wherein the controller is operable to send the one or more storage device commands by using one of

an in-band protocol or an out-of-band protocol (see disclosure of the use of an in-band protocol, claims 18 and 21).

It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize an in-band protocol, since this allows the transmission of commands over a widely dispersed network where the use of an out-of-band protocol might be impractical.

42. Claims 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ohran et al.** (U.S. Patent 5,649,152) as applied to claims 23, 26, 28, 29, 31, 34, 36, 37, 39-41, 45 and 46 above, and further in view of **Simpson et al.** (U.S. Patent 6,128,306).

43. Regarding claims 42-44, **Ohran et al.** teaches a storage system and method substantially as claimed.

Ohran et al. does not explicitly teach a storage system and method comprising a list of blocks to be copied which is reordered to optimize copy speed, wherein control data is inserted before and after the source data block, nor wherein the list is buffered.

Simpson et al., however, teaches a storage system and method comprising a list of blocks to be copied which is reordered to optimize copy speed (see col. 2, lines 15-18), wherein control data is inserted before and after the source data block (see col. 2, lines 5-9), and wherein the list is buffered (see col. 1, lines 55-58).

It would have been obvious to one of ordinary skill in the art at the time of the invention to include prioritized buffering of output data, since this allows more flexible handling of outgoing data traffic, and furthermore since input/output buffering and prioritization and reordering of data in queues was well known in the art at the time of the invention.

Response to Arguments

44. Applicant's arguments filed 13 June 2008 have been fully considered but they are not persuasive.

45. The Applicants argue that the prior art of record fails to teach the step of 'determining if the range of bytes [of the received write request] is within the snapshot'. What this step makes inherent in the claimed invention is the ability to define a snapshot/copy event as including a subset of the data on a given media/disk. Only then would the step of checking to see if a write command addresses data which is part of the snapshot/copy event.

The Applicants are thus arguing that the prior art of record does not teach a system for generating a snapshot/initiating a copy operation that involves a subset of the hard disk, and that the claimed invention is patentable because it includes provisions for performing the claimed process upon the receipt of a write request only for areas of the hard disk involved in the snapshot/copy process.

The **Ohran et al.** reference discloses that the mass storage system 104, illustrated in drawing Figure 1, can be 'any writable block-addressable storage system, such as one or more disks or a partition of a disk…A partition of a disk can be a fixed area of a disk.' See column 3, lines 50-56. It is thus established that the disclosed mass storage system can be a subset of the entire addressable storage system accessible to the digital computer 102.

In the disclosed process illustrated in the flow diagram on drawing Figure 2, the process (after clearing preservation memory and creating the snapshot) 'waits until there is a write operation directed to mass storage system 104' in step 206. See drawing Figure 2 and column 4, lines 35-36.

Since, as discussed above, mass storage system 104 can be a subset of the entire addressable mass storage system accessible by digital computer 102, the claimed step of 'determining if the range of bytes [of the received write request] is within the snapshot' is inherently embodied in the disclosed step 206, wherein the method 'waits until there is a write operation directed to mass storage system 104'.

In the case where mass storage system 104 is a partition of a disk, as disclosed at column 3, lines 50-51, then the claimed 'determination' step occurs whenever a write request is received by digital computer 102. If it is determined that the write request is a request to modify a range of bytes in a partition *different* than mass storage system 104, then the system will remain in step 206, since step 206 waits until there is a write operation directed to mass storage system 104, a single partition on a disk.

However, if it is determined that a write request is directed to a range of bytes within the snapshot range (a write operation directed to the partition embodied as mass storage system 104), then the process proceeds to step 210, as recited in the rejection of record.

Thus, the claimed determination process is anticipated by the process of waiting until there is a write operation directed to mass storage system 104, since mass storage system 104 can be embodied as merely a single partition of a hard disk. Unless the write operation is directed to the partition [mass storage system 104], analogous to the claimed snapshot range, the steps of checking to see if the range of bytes has yet been written to the snapshot does not take place, as in the claimed invention.

The rejections of record are maintained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luke S. Wassum whose telephone number is 571-272-4119. The examiner can normally be reached on Monday-Friday 8:30-5:30, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Cottingham can be reached on 571-272-7079. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

In addition, INFORMAL or DRAFT communications may be faxed directly to the examiner at 571-273-4119, or sent via email at luke.wassum@uspto.gov, **with a previous written authorization in accordance with the provisions of MPEP § 502.03.** Such communications must be clearly marked as INFORMAL, DRAFT or UNOFFICIAL.

Customer Service for Tech Center 2100 can be reached during regular business hours at (571) 272-2100, or fax (571) 273-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Luke S. Wassum/
Primary Examiner
Art Unit 2167

lsw
27 August 2008